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Study on Interfacial Double layer Capacity

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As the total capacitance of a dropping mercury electrode increases with the drop growth, resonance can be observed at an instant in each dropping period by proper choice of a.c. frequency and load inductance. The differential capacity per unit interfacial area can be estimated from the consideration of the resonance and the interfacial area at this instant.

The shapes and positions of the capacity-bias voltage curves obtained depended specifically on the anionic species in solutions in zero as well as in anodic regions. The potentials of the peaks of humps occurring near a.c.m. were independent of the cationic nature, and had almost the same values for given anionic species except sulfates. The capacity values of humps followed the order of the polarizabilities of corresponding anionic species. These humps became less evident with dilution of solution, indicating that they were attributable to the properties of the non-diffuse double layer. Relations between log Ch and $\log\gamma$ in the case of halogens and $\log\gamma'_{12}$ in the case of halogenates showed linearity with positive inclination of about 1.7.

The capacity values in cathodic region were dependent on neither cationic nor anionic species in solutions, having almost equal values defined by the concentration of solution. From a simple model of electrostatic condenser, the effective dielectric constant of water between mercury surface and outer Helmholtz plane was calculated to be about 7.5, which was considered to be a proper value if we assumed the dielectric saturation in this layer.

Tendencies of capacity minima in zero region began to appear in more dilute solutions. This was quite in accord with the theory of double layer structure, because diffuse double layer capacity, which was in series to the non-diffuse double layer capacity, had the very property and began to affect the whole capacity value as the solution became dilute.

Theory and Application of *U*-effect

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When the double layer in a glass capillary is forced to vibrate mechanically, generation of a.c. voltage can be observed between its two ends, which we